THE VETERINARY JOURNAL

Editor :
T. DALLING, M.A., M.R.C.V.S.

Sub-Editor :
PROFESSOR J. McCUNN, M.R.C.V.S., M.R.C.S., L.R.C.P.,
Professor of Anatomy, The Royal Veterinary College.

NOVEMBER, 1943

EDITORIAL

RESEARCH WORK AND ITS FIELD APPLICATION

ALTHOUGH it is generally held, and with justification, that the amount of research work carried out on the cause and control of diseases of livestock in this country has been somewhat scanty, there are many indications that this state of affairs is now being remedied. There seems little doubt that research into problems of animal health will occupy an increasingly important place in agriculture in the future. We cannot complain of the quality of the past researches on the whole, for a considerable amount of important results have been obtained, and the results are now bearing fruit in the field. While these results may be meeting immediate requirements in controlling the concerned diseases to some extent, there is need for research of a wider nature in order to examine whether alterations in our standard methods of husbandry and management will produce a fundamentally healthier animal which can also be maintained in health. For such study it will be necessary to have combined action by personnel trained in, and fully conversant with, the various sciences which can be applied to the problems. This can be done by well-organised, planned and supervised research work.

We may not all have the same conception of the meaning and implications of research work. Research work is not necessarily confined to a laboratory. It is true that the initial stages of much of the research work on problems of diseases of livestock very often means a laboratory study, but, having reached a certain stage there, it is essential that field trials be carried out. These are capable of answering many of the questions that are bound to arise in the course of an investigation. There are many conditions in the field which do not arise in the laboratory, even although livestock kept at the laboratory or near it are used in the early stages of the inquiry. Field trials must be carried out on an

extensive scale and under as many conditions of husbandry and management of the animals concerned as possible. The economic and practical aspects of the methods of control must receive due consideration. Such field trials, therefore, must be carefully planned and must be under expert supervision, and must be continued until the true value and the practicability of the method has been proved.

THE VETERINARY PROFESSION AND BOOKS

An instructive correspondence has been lately carried on in *The Times* and other newspapers with regard to the shortage of books of all kinds and types. Presumably the intention is to endeavour once more to get the Government to take an interest in the matter. Certainly, as far as education is concerned, things are in a pretty parlous state when a headmaster can report that out of 3,764 books required for his boys, 1,135 were unavailable, and the College of Nursing that from 40 per cent. to 50 per cent. of text-books for nurses could not be obtained. The position is similar with the classics. Not more than half at most of "Everyman's Library" and the "World's Classics" are in print. The publishers complain that in addition to their being held down to a quota of 37½ per cent. of a pre-war year, the Government permits anyone to open up a publishing business and to obtain paper from the Paper Controller and to use paper in the possession of printers, a class of paper the established publisher is forbidden to use. Mr. Newcomer can print on paper held by others, using the paper to publish absolute rubbish if he wishes, while the established publisher wanting paper badly for essential books has to stand by and look on. We agree with the leader writer of the *Observer*, who remarked: "Controls are rarely likeable, but at least they might be logical." It is surprising how small is the paper allowed to the publishing trade to supply the world—only 20,000 tons per annum. Compare this with 100,000 tons used by the Stationery Office and 25,000 tons consumed by the War Office, and the illuminating figure given by a publisher, Mr. Stanley Unwin, that an extra 1,000 tons of paper would produce something like 5,000,000 new books. We cannot believe that the Government is prepared to sit by and allow the nation's children, medical or veterinary students, nurses in training, research workers (the list can be added to indefinitely), to be without the books essential to their needs: still less is it likely that the Government will allow our cause to be hindered by lack of books. But obviously action is needed, and we hope it will be promptly taken.

General Articles

BRITISH FARMING—NUTRITION RESEARCH

By DR. CHALMERS WATSON (Retd.)
Fenton Barns, Drem, N.B.

SPECULATION is now rife amongst agriculturalists as to the main principle on which the Government's new policy is to be determined. A question of outstanding importance to the industry is whether the future policy is to be very largely determined by reference to the "Nutrition theory," whereby the industry would concentrate on the production of so-called "protective" foods, e.g., milk, eggs and vegetables, which can be largely produced in this country, leaving other foods, e.g., wheat and meat, to be imported from other countries where they can be produced more cheaply. While all will agree that it should be our aim to make home production meet nutrition requirements as effectively as possible, many will, on reflection, contend that in the present state of knowledge great care is necessary in using the "protective foods" theory as the too complete foundation for a new agricultural policy.

More attention is now being given to the health of the soil and how it should be maintained if the maximum amount of protective substances is to be present in the food grown for man and animals. This comparatively new line of thought was instructively presented in a query in the recent presidential address of the Scottish Sanitary Association by Dr. H. Rae, Aberdeen: "May there be a greater degree of correlation than we have hitherto suspected between the health of the soil, the quality or health of the crops grown, and human health?" The highly suggestive pioneer work of Sir Albert Howard is called to mind by this query, and the various issues raised by it merit much attention at the present time.

Nature's Cycle—the Soil, the Plant, the Animal, and Man

A fertile soil is unquestionably the basis of agricultural prosperity. Fifty years ago some classical research work was recorded in the "Clifton Park Experiments" by a famous Scottish farmer, Mr. R. H. Elliot, who devoted much attention to deep rooting plants (grasses), which convey from the air into the deeper soil the nitrogen required for the full maintenance of its health, and the production of the maximum amount of fresh living food. Elliot, however, was a man before his time, and his work passed too largely into the limbo of the unrecognised and the forgotten. His great British successor, Sir George Stapledon, in "The Way of the Land," well points out that insufficient attention has been paid to the teaching of Elliot, who, as a practical agriculturalist "beginning to realise that our chessboard system of farming was played out, wrote convincingly on the basis of his actual experiments." Sir Albert Howard's pioneer researches on the soil have a definite bearing on the excellent work of these two great practical agriculturalists and researchers.

In his capacity as Imperial Economic Botanist to the Government of India

from 1905 onwards, Sir Albert Howard had the opportunity of studying diseases induced by various fungi and pests, and he, rightly or wrongly, came to the conclusion that insects and fungi are not the real causes of plant diseases, but only attack unsuitable varieties or crops imperfectly grown. He studied the diseases of crops grown in a way of which he disapproved; he later acquired facilities for growing crops in his own way, in time increasing the limited amount of farmyard manure normally available by the production of compost manure from decaying vegetables and animal residues converted into humus. His new teaching, indeed, is essentially based on the formation, the use and the value of additional organic manure in the form of "compost," which, from long extended experience he regards as greatly superior to the modern artificial manures extensively used for (a) the maintenance of the health of the soil, (b) the production of healthy crops free from disease, and (c) the special quality of the foods obtained for the sound nutrition of man and animals. He contends, and many will agree with him, that the mere "chemical" composition of food, even after including its elaborate analysis for "vitamins," cannot be regarded as conclusive of its real value, the "biological" value of a food being more elusive, and not yet capable of being fully ascertained by any known laboratory methods. I commend to my readers the concluding sentence in an appreciative Editorial Note in THE VETERINARY JOURNAL of March, 1943, on Sir Albert Howard's paper in that issue on "A New Policy for Veterinary Science": "To some, Sir Albert Howard's views may be new, others may contest them, but they merit the most careful consideration of all."

A considerable amount of independent testimony to the value of Sir Albert Howard's teaching is already available from many quarters (South Africa, New Zealand and U.S.A.), amply sufficient to justify the plea that appropriate research should be carried out in this country to confirm, or otherwise, his teaching. Two correlated questions are associated:

(1) The existence of a "vital" property in food which is not fully revealed by skilled laboratory analysis?

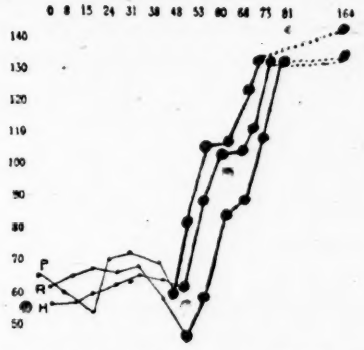
(2) Whether, while recognising the value of "artificials" in crop production, the great reliance on artificial manures in common use insidiously impairs the health of the soil, predisposes to disease in the plants, with a resulting unfavourable influence on animal nutrition and the resistance of animals to disease, with, in sequence, a similar impairment in human nutrition and resistance?

The first of these questions cannot be lightly dismissed by the mere assertion that the existence of such a vital property is unknown and unthinkable.

A "Vital" v. "Chemical" Factor

The existence of a "vital" function and "vital" property in foods was strikingly suggested to me forty years ago from the results of an extensive series of investigations on nutrition, which extended over many years, in which many qualified researchers took an active part, the term "vital" being defined as "instinct with life." An illustrative graphic chart from this series of experiments was highly instructive. This particular experiment was directed to test

the recuperative power of a diet of bread and skimmed milk on young rats fed on an abnormal diet (rice, porridge and horse flesh) for six weeks after weaning, and then changed over to the bread and skimmed milk. The instantaneous and dramatic changes that followed are indicated on the chart, in which the top figures represent the days since weaning, the figures on the left being the weight in grammes. The explanation then given of the remarkable changes revealed was that there had been a "loss of some vital function or functions, and more especially of those concerned with warding off bacterial infection from the



The influence of a bread and skimmed milk diet on young rats previously fed on an abnormal dietary. The curves represent the weight of three young rats that were fed on porridge, rice, and horse-flesh, respectively, for six weeks, and were then (forty-eighth day) transferred to a bread and skimmed milk diet.

respiratory and probably also the alimentary tract." Some years later this subject was brilliantly illuminated by the discovery of "vitamins" by Hopkins and others. Immensely valuable as "vitamins" are in the treatment of sick men and sick animals, a lengthy medical experience has convinced me of the pre-eminent importance of securing these vitamins as far as possible from fresh foods grown in a healthy soil.

Great caution is necessary in accepting too readily the conclusions arrived at from highly skilled laboratory research work as being applicable to the established practical conditions which called for the research. This is emphasised by the following experience. Many years ago the curative influence of sunshine on rickets was fully established, as was also the special value of milk which had been irradiated by the "ultra-violet rays," Vitamin D being essentially the responsible factor in the cure. Curiosity then prompted the examination of a sample of irradiated milk by highly skilled laboratory test to determine the presence and relative amount of Vitamin D. The official report revealed the presence of Vitamin D, but "in very small amount compared with that present in certain medicinal preparations of Vitamin D." Neither the skilled finding of the laboratory test nor the bona fides of production of the remedy were for a moment questioned. What did appear to me, however, to be open to question was the too great readiness to apply conclusions from laboratory findings alone or too largely, in the absence of the experience and opinion of the skilled practical men in the industry who had an intimate knowledge of the practical side of the

problem which formed the basis of the research. To illustrate—I had just then seen a few cases of advanced rickets which had been treated for some months under careful hospital conditions, the treatment including the medicinal vitamins referred to in the report, in which, when the milk which had been used for some months in the diet without any apparent benefit, was replaced by an equal amount of milk which had been appropriately irradiated with ultra-violet rays, a very remarkable recovery indeed took place in a few weeks, all the other conditions of treatment having been maintained throughout. Taking the long view, I am satisfied that "science" as sometimes now applied may become a grave national danger.

The Middle Way and the Importance of Research

If the national policy is framed too exclusively on the "protective foods theory," it could hardly fail to react unfavourably on the nutrition of the soil as a whole, through the loss of the organic "living" foods in the "muck" from the sheep and cattle, on which the nutrition of the healthy soil so much depends. Nature is indivisible, and the new principle referred to above should receive very careful consideration indeed. From the point of view of national policy, the sound line of approach is, in my view, correctly indicated in the pamphlet dealing with "Looking Ahead: Agricultural Reconstruction" (Conservative Party Sub-Committee), as follows:

> "Sources and availabilities of protective foods are in transition. Inherent agricultural circumstances are controllable, or capable of being met, to so small a degree that by comparison they must be regarded as unchangeable. Agricultural policy must allow for transient circumstances, but cannot be founded on them."

In conclusion, I respectfully submit a plea for research, made with an open mind, directed to test the value of Sir Albert Howard's work and teaching. Do we not still live too largely in a world of tradition and lack of flexibility? What does seem lacking to-day is a wise appreciation of the significance of science in relation to human and industrial progress. The truly scientific spirit which is the essence of progress is sufficiently prevalent in the industry to allow for a greater number of highly skilled practical farmers exercising a larger influence in the higher Councils of Research.

I believe it is possible, and indeed probable, that if the State would use a part of the farms and laboratories under its own control and management, appropriately co-operating with other control centres as could be arranged for such an investigation, the results achieved, even before the first five years' experimental period was concluded, would far exceed in value those likely to be achieved in the next thirty years under the existing system of research administration.

WILL THERE BE A SECOND BLACK DEATH?[1]

By F. SYKES,
Chantry, Chute, Wiltshire

WHEN Sir Albert Howard made his first visit to Chute farms early in the summer of 1942, he was so impressed with the results achieved and the unusual technique employed that he asked the writer to prepare and read a paper at the Farmers' Club in London. This invitation was respectfully declined because I am a student of agriculture and not a teacher, and furthermore because I think I belong to that group of quiet farmers whose modesty tells them, speaking generally, that "those who can, farm—those who can't, teach." Sir Albert, however, is a charmingly persistent character who is not easily disposed of, and I was eventually induced to contribute two articles,[2] of which this is the second.

My farming life started twenty-nine years ago and began with a basic interest in Friesian cattle and Berkshire pigs. By 1923 our herd of Friesian cattle ranked with the best in the country, in the show yard and in milk production. Most of our foundation stock were the winners of the 500 Guinea Cup, and later we won the Makbar Gold Cup for the best herd of dairy cattle in the counties of Buckinghamshire, Berkshire and Oxfordshire. At the Royal and all other leading shows our stock was well to the fore. Kingswood Ceres Daisy, who gave 6,600 gallons of milk with her first three calves, was in our herd. In Berkshire pigs we bred and exhibited the famous sow, Richings Beauty 1st, who won the supreme championship at the Royal Show in 1924. For years breeders from all over the world sought descendants from this animal.

Encouraged by these and many other successes we embarked upon the breeding of thoroughbred horses, and again Dame Fortune smiled upon our efforts. We were lucky, indeed, to breed Statesman, who ran third to Hyperion in the Derby and who is now a leading stallion in Japan; His Reverence, one of the best horses of his year, now a promising stallion in Ireland; Solicitor General, one of the leading stallions in New Zealand, and others. While using all the skill and knowledge of which we were capable, it must be recorded that we had our fair share of good luck without which the highest awards of stock-breeding are not always forthcoming.

But all good times come to an end, and one realises as time passes that real knowledge comes from vicissitudes rather than from success:—

> "Vicissitudes of fortune, which spares neither man nor the proudest of his works, which buries empires and cities in a common grave."

And, indeed, so it happened to my two brothers and to me, for our long run of achievement in live stock production and showing was now to end with dramatic suddenness. The Ministry of Agriculture had been made aware by scientists and by public opinion that all was not well with the nation's milk supply, and by way of grading up the dairy cattle the first Accredited Milk Scheme was established. As one of the leading breeders we were asked by the University of Reading to show the way to other stockmen by submitting our herd to the Tuberculin Test. We agreed. Judge of our surprise when

66 per cent. reacted—the premier herd of the three counties—what must have been the condition of the other dairy cattle in that area?

This startling result gave us much food for thought, and it was some time before we could diagnose the cause. We pedigree breeders have a saying: "50 per cent. of the pedigree goes in at the mouth." Therefore, we concluded there must be something amiss with our system of feeding. We eventually suspected that the cow, with her four stomachs, was not a concentrated food converter, but, in her natural surroundings, a consumer of "roughage." Were not the highly concentrated cakes, with their well-known stimulating abilities for the production of rivers of milk, the cause of the decline of the health and stamina of our cattle? We thought it over. We consulted famous authorities. We had produced fantastic milk records, had been accorded the highest awards in the show rings, but it was at the expense of the health and constitution of the cows.

We then took a decision requiring both courage and action. We would completely reverse our milk production policy; we would feed the cows more normally, abandon high milk yields, and make the health and constitution of the cattle our primary object, and milk production secondary. We held a dispersal sale of our valuable Friesian cattle, which had taken so many years to breed and which had, in the eyes of the showman and record-breaker, achieved so much. We then went in for Channel Island cattle, and here good fortune again attended us in the show yard, for we bought as a calf the bull, Christmas of Maple Lodge, which won the supreme championship at the Royal Show at Chelmsford.

But troubles seldom come singly:—

"In trouble to be troubl'd
Is to have your troubles doubl'd."

At this same period our most valuable thoroughbred mare contracted the dreaded disease—contagious abortion. An eminent veterinarian advised her destruction. I declined the advice and determined a treatment of my own, which was to turn the mare out into a large paddock where no horse stock had been grazed, where artificial manures had never been used, and where she was condemned to live for two years eating practically nothing but grass. At the end of this period she was examined by a veterinary surgeon and declared clean. She was mated and artificially inseminated; she later proved in foal, and subsequently bred over the next seven years four valuable foals, she herself living to the ripe old age of twenty-one. Here was my first attempt to cure an allegedly incurable disease by giving the creature nothing but grass grown on land where artificial manures had never been applied, in other words,

Nature's food from humus-filled land

In the early nineteen-twenties I had the good fortune to meet the late Major Morris, of Aston Tirrold, Berkshire. He became the trainer of my thoroughbreds, and in succeeding years I was to see and learn much that was to shape my future agricultural policy and practice. Morris was a man of the highest character, education and farming knowledge. He was years ahead of his time as a grass grower and knew how to establish the sward for a race-

horse paddock such as none of his generation ever created. His experience was not available to all, but being both a patron and a friend I was privileged to learn much from him. Bone of that extreme density which is only to be found in the cannon-bone of the deer is the object of every racehorse breeder. This can only be obtained by growing the right kinds of grasses and clovers on lands that are in good living health and balance. From Morris I learned those elementary lessons which stood me in good stead in later years. Morris farmed some 2,000 acres of Berkshire light downland, yet on that thin soil he grew the heaviest crops of grass and clovers I had ever seen. Our land at Richings Park—"rich ings" means "rich meadows"—would grow good crops of potatoes, mangolds and the like, but never grass in the quantity and quality that Morris used to grow. I determined to sell the estate at Richings Park and find a place high on the chalk hills where some of the practices of Morris could be tried out.

In 1934 we left Richings, and in 1936 bought Chantry, Chute, in the County of Wiltshire, the highest-lying farm on the eastern escarpment of Salisbury Plain. £4 per acre was all this land was worth, but Richings found ready buyers at £100 and over per acre. I took a Yorkshire farmer to see my new property and he said: "To think that you, who have achieved so much as a live-stock man and a farmer, could be so unwise as to buy land like this. This is not farmland—it is just space out of doors." Encouraging comment!

After killing many thousands of rabbits we settled down to farming a real piece of England's neglected acres. The first implement I ordered was a subsoiler. The look of permanent surprise that covered the features of the agent receiving the order was worthy of *Punch*. "Do you know, Sir, in all our experience we have never supplied such a thing; what do you want an implement like that for in a god-forsaken country like this?" Yes, there was a lot of encouragement everywhere. But my knowledge of farming had told me two things—that you cannot farm without the plough, and that its full value can only be obtained if its operations are preceded by those of the subsoiler. To prove this one of many such stories will suffice. The subsoiler broke down after only part of a field had been done. There was no time to repair it, so ploughing and re-seeding with barley followed. The few acres that had been subsoiled grew a splendid crop, the rest of the field practically nothing. The next year the whole field was fallowed and subsoiled, and wheat was sown. The crop is now to be harvested and is one of the best in the county. Its yield is estimated at fifty-six bushels to the acre. Subsoiling alone was responsible for this improvement.

A new herd of Guernsey and Jersey cattle were got together and kept on the movable open-air milking system, being moved every day and so all over the farm. In this way the land is uniformly refertilised by dung and urine, and as each field has been sufficiently grazed and dunged, ploughing of the old turf takes place, followed (during war time) with three corn crops, after which it is cleaned and laid down to a four-years' ley containing the following mixtures of grasses and legumes:—

10 lb. Cocksfoot.	10 lb. Common Milled Sainfoin.
3 lb. Timothy.	6 lb. Lucerne.
3 lb. Italian Ryegrass.	2 lb. *Mellilotus alba.*
1 lb. Rough-stalked meadow grass.	2 lb. Hants Broadleaf Clover.
2 lb. Crested Dogstail.	2 lb. Alsike Clover.
2 lb. Meadow Fescues.	1 lb. S.100 Clover.
	4 lb. Kidney Vetch.
	3 lb. Burnet.
	3 lb. Chicory.
21 lb. of grass seeds.	33 lb. of legumes and deep-rooting plants.

A total of about 54 lb. of seed to the acre, which gives me some 22,000,000 seeds per acre.

The details of farming technique which I have devised are important :—

(1) Subsoiling two feet deep.
(2) Several ploughings.
(3) Several harrowings.
(4) Thorough land cleaning.
(5) Two heavy roller rollings.

The subsoiling two feet deep aerates the subsoil and splits into fragments the underground colloidal pan, thus opening up an unlimited store of mineral plant food which the deep-rooting varieties will seek in a very short time. The ploughings and other cultivations aerate the top five inches of topsoil, work down a fine tilth, which is indispensable to a good grass establishment. The deep-rooting plants like sainfoin, chicory, burnet, kidney vetch and cocksfoot go deep down into the earth for several feet, bringing up both minerals and moisture in abundance, and make the sward drought-resisting under the hottest sun, while all the leguminous plants draw copious supplies of nitrogen from the air and make this available in the soil for the grasses. This ley is left down four years: the first year it is grazed; the second, hay and grazing; the third, hay and grazing; the fourth all grazed, after which it is ploughed under for roots and the sowing takes place on the upturned sod. The old turf and the wastes of the live stock are transformed into humus by natural agencies —in other words, sheet-composting takes place all over the field. Enormous weights to the acre are grown; the next year a crop of oats or wheat; then a clean and the sowing of a second cereal; and the fourth year it is sown back to the grass and clover mixture as before. Neither farmyard muck, nor compost, nor artificials are applied. The organic refertilisation is performed by the controlled intensive grazing of cattle, sheep and geese, which stock, in the four years of the ley's duration, deposit at least twenty tons of dung and urine per acre, and this is harrowed in frequently to secure uniform distribution. This organic activation, coupled with the considerable root system of the ley when ploughed under at the end of its four years, provides the land with such a surplus of humus that one or two heavy crops of roots can be taken, two corn

crops, and there is still enough surplus humus to re-establish the next new sward when the grass seeds are sown for the next rotation. The grass and clover seeding is very heavy, but my experience tells me that this is a wise proceeding, in so far as it smothers out all the weeds and secures an amazing sward in the first year of establishment. I have this year cut seventy acres of land under such a sward, and it must have averaged from two to three tons to the acre of hay, and this on land 800 feet above sea level and for which none of my friends would say a good word when it was bought. Good average meadowland of the permanent grass type seldom gives more than one ton to the acre.

I have so far dealt with the first steps in the reclamation of a piece of worn-out land. Spectacular as are the results obtained, I am convinced they are only the beginning and that it is possible to raise the fertility of Chantry still further and to carry a much larger head of live stock. This can be achieved by converting the large volumes of unused straw and the other vegetable residues of the farm into muck and then into compost. Once the mechanisation of the compost heap has been achieved and a tractor-driven muck-shifting crane becomes available, it will be possible to multiply the volume of farmyard manure by three or four and to improve its quality. Such a machine is now being tested and will in all probability soon be available. Then all the wastes of the farm—vegetable and animal—can be returned to the soil in the shape of freshly prepared humus. In this way the full effects of subsoiling and of the deep-rooting ley will be obtained and results now undreamt of will be available for all to see.

When the whole of the farms of England are farmed with compost—and I am sufficiently sanguine to hope that one day they will be—there is not the slightest doubt that we can grow enough food here of every kind (excepting citrus fruits, tea, coffee and the like, which represent a small amount in the aggregate) to sustain a population of more than twice that in Britain to-day.

But our experience at Chantry was not nearly so cut and dried, or so straightforward and easy, as the foregoing account might lead a reader to believe. We bought valuable cattle and put them on land which was couch-ridden and very infertile, and the ability of which to sustain life was so low that food of every kind has to be bought elsewhere to augment the supply of the poor herbage. Then heavy stocking and treading began to develop other troubles and, as always on dirty, foul, neglected land, disease of every kind began to show itself in the cattle. Contagious abortion—the most devastating of all complaints—mastitis, Johne's disease, tuberculosis, all took their toll, and before we were through with them all we lost cattle to the pre-war value of over £2,000 (to-day's value, over £8,000). The veterinary service could help us but little. As is usual, the course followed had to be devised by the farmer.

We decided to plough up the whole 750 acres. We determined to rely upon home-grown food, especially avoiding all factory compound foods and concentrates, and, above all, *not to apply artificials.* After seven years of heart-breaking toil, with the added difficulties of war-time conditions thrown in for luck, we have (touching wood): (1) completely rid the farm of disease; (2) built up a large herd of home-bred, attested dairy cattle, tuberculin-free for over

three years now, and of a soundness of constitution to all critical appearance such that no expert would ever believe that any scourge had ever visited the farm; and (3) as each succeeding generation of young stock is born they show unmistakable evidence of still greater stamina and endurance.

Now, we did not bargain for all this trouble, and it was as unwelcome as it was unexpected. Our ability to deal with it, however, is something rather remarkable, for we have not only dealt with it, but got rid of it. How has this been done?

To achieve this result we have based our policy on the premises that the health of the soil, the plant and the animal are interdependent, and that the refertilisation of the soil—the basis of life where we all begin—*is biological and not chemical,* and this can be accomplished only by the agencies of animal dung and urine acting upon the decaying vegetation of the farm *to form humus,* and that chemical fertilisers (particularly those of nitrogenous content) must not be applied to the land, because while they may momentarily stimulate a crop they do noticeable damage to the soil. That these premises are sound is proved by the fact that twice in fifteen years we have had serious diseases of animals to deal with and, with humility, we have won the battle.

Sir Albert Howard wishes me to put on record the whole of my experiences and the accumulation of details of evidence to support the system of farming which has now been laid down for the land at Chute and which, after much travail, is now working smoothly—and nothing short of a book will suffice to give me the space I need to set out the facts and results in their proper sequence and forcefulness. But in the space of this article I will attempt to set forth briefly my views of the urgent need for the wide application of my system of farming, if this country in particular and the world as a whole are to avoid the major catastrophe that may be lying not very far ahead. This task is by no means easy within the scope of a single article.

Therefore, I will ask myself, what are the major lessons that I have learned after twenty-nine years of farming observation? They are: (1) that the well-being of mankind is interdependent with that of the animal, the plant, and the living soil; (2) that a fertile soil is one rich in humus; (3) that whenever the humus content of the soil is depleted (as in the growing of a wheat crop), the humus must be replaced with more humus manufactured by the mechanism of biological processes, e.g., vegetable growth (as in grass) and its decay when ploughed (accelerated and activated by the micro-organisms of animal dung and urine).

If the world as a whole adopted these hypotheses, what would be the result? A healthy, robust, and practically disease-free human race, because man—who is healthy according to the food he eats—would live on a healthy diet of wholesome and disease-free milk and animal products, healthy vegetables, and wholemeal bread. All would be grown on soil that was humus-sufficient and disease free.

If the health of a nation depends on the above factors, why can we not adopt my system of farming to-morrow and in five years have a disease-free world? Because for over a hundred years the world has laboured under a sad and pitiful delusion—*that the refertilisation of land is chemical and not*

biological, and because there have grown up in England and America most powerful vested interests who will not allow the world to be disillusioned.

Then is there no hope for mankind? Yes, there is one hope—*disease*.

The continued use of the artificials on the one hand, which produces food of diminishingly efficient feeding value for both man and beast, is reducing vitality so low that resistance to disease is becoming less. On the side of man's interest, notwithstanding the formation of the Ministry of Health, with its myriads of enactments, its inoculations, its housing and its hygiene, with the spending of millions sterling, disease in man still defies the world. The source of all disease is in the food we eat, which comes from the soil. *Start there.* Make a healthy, living soil. Grow thereon a healthy plant. Produce a healthy animal, and in turn a healthy man, and the Ministry of Health can be liquidated in a very short time.

The second mistake is the feeding of concentrated cakes and meals—the by-products of the soap and oil industries (which produce more powerful vested interests) to cattle and poultry to stimulate the production of unnatural quantities of meat, milk, eggs and poultry meat. I have cured disease in animals by cutting out the feeding of factory-made concentrates and substituting food like oats, peas and beans, and grass grown on humus-sufficient fertile land on the farm.

Two difficulties present themselves:—

(1) Farmers will not cease to use artificial fertilisers for their land, because they have been taught by clever propaganda over a long time that it is more profitable to use them for crop production than the keeping of and relying upon live stock, and they are averse to the wide use of humus because this involves labour, which is difficult to obtain and costly.

(2) Farmers will continue the use of factory concentrates for their cattle feeding, because, again, persistent skilful propaganda has driven it into their heads that they can produce neither milk nor meat without them. It does not begin to occur to one farmer in a thousand that the prevalence of contagious abortion, tuberculosis and the other ills of their live stock may be brought about by the use of artificials on the land, or the use of the concentrated cakes fed to their cows.

And so *disease will come.* Come? It is already here, everywhere, in abundance. There are very few disease-free herds in the country. Foot-and-mouth is periodically rampant; tuberculosis is most dangerously prevalent; mastitis is as common as the dawn of day; Johne's disease and barrenness are rife everywhere. It is estimated on reliable data that 80 per cent. of dairy cattle passing through the markets are diseased in one form or another. The milking life of the average dairy cow is now reduced to two and a half years.

Are those in authority worried? Yes, indeed they are. As remedies they suggest vaccines and veterinary panels. But why not start at the bottom, in the soil itself? It would appear that no one has ever thought of this approach. In officialdom you must never go to the root-cause of trouble—that is a most unprofessional approach.

And so before the nation can have disease-free food—food with good nutritional composition—we must first of all endure the terrible agony of a wide visitation of plague or disease which will make the *Black Death* appear like a summer's afternoon picnic in comparison. Disease may become uncontrollable in cattle ere long and through meat and milk will transfer itself to men, women and children. We shall lose millions of live stock and, perhaps, millions of our human population. And then—what then? Someone will arise in the midst of a bewildered community and point to the warnings of Sir Albert Howard and Farmer Sykes, and enquire why their advice was not heeded; and since by that time most of the beneficiaries of the vested interests of both artificials and cattle cakes will have succumbed to the plague—well, a trial, anyway, will be made of my system of farming.

What a pity it is that such an experience appears to be the inevitable and only way to bring a world, which places vested interests before life itself, to any sense of true decency of conduct and sensible action, for only by downright disaster will man repent the error of his ways.

Is it not possible that great men like Dr. Temple, Mr. Churchill, Mr. Roosevelt and General Smuts—and all are agreed these four are really great men—could be induced to investigate this important subject of *humus-fertile land,* its bearing on human and cattle disease? Yes, in my opinion, it is possible that they could be influenced to take action and impartial investigation.

The Union of South Africa is already becoming compost-minded and great strides are being made in the faithful adoption of Nature's great law of return. In the United States the resources of the Rockefeller Trust are available for demonstrating on a large scale the great principle that a fertile soil means healthy crops, healthy live stock, and last, but not least, healthy human beings.

There is still time, but not too much time, to establish this great truth before the war ends, so that when peace comes agriculture can take its proper place in the world of to-morrow and the public health system of the future can be based on a soil in good heart.

The real arsenal of democracy is a fertile soil, the fresh produce of which is the birthright of the nations.

REFERENCES:

(1) The Black Death (1348-49) was succeeded by four outbreaks of similar disease before the end of the century. It destroyed from one-third to one-half of the rural population. But the great pestilence was not an isolated incident, but the last and worst of a series of plagues which swept over England for a hundred years or more as regularly as trade booms and slumps do now. Shortage of labour and rural unrest compelled a reform of farming. But it was many years before the land recovered. Throughout the closing years of the fifteenth century successive outbreaks of murrain killed numbers of cattle and sheep, swept off geese and poultry, and even destroyed the bees. The Black Death was, therefore, preceded and followed by disease in the live stock. ("English Farming—Past and Present." Third Edition, 1922.)

(2) The first of these articles appeared in the sixth issue of the *News Letter on Compost,* June, 1943.

A POSSIBLE NEW SPECIES OF TREMATODE PARASITE IN THE KIDNEYS OF THE KING PENGUIN (Aptenodytes longirostris).

By J. G. CAMPBELL,
Department of Poultry Diseases, Royal (Dick) Veterinary College, Edinburgh,
and
J. E. N. SLOAN,
Department of Helminthology, University of Edinburgh.

THREE years ago, whilst engaged in a post-mortem on the body of a king penguin from Edinburgh Zoological Gardens, it was noticed that the ureters and their main intra-renal branches were rather prominent, and that they contained a whitish muco-purulent material. Microscopical examination of some of this material showed it to consist of granular leucocytes, epithelial cells and mucus. It was whilst examining this that a typical trematode egg was discovered (FIG. 1). Further search revealed numbers of eggs, especially numerous at the proximal ends of the ureter and in its main branches in the kidney. Several small flukes were also found lying free in the lumina, and dissection of a kidney with the aid of a lens, showed many similar parasites lying in cyst-like diverticula in the distal ends of the ducts of Bellini, or in the medullary rays.

Since then, the bodies of five more king penguins have been examined, and in all of these, similar parasites have been found in the kidneys, sometimes in large numbers and all in various stages of development. Blocks of tissue from various organs of all these birds were taken for histological examination, but only the kidneys were found to contain flukes.

A summary of the post-mortem findings in the birds is given below.

King Penguin 31,287 (*No. I*).—*Imported April,* 1936. *Died* 21/8/40.

This bird had pneumomycosis (**Aspergillus* sp. isolated) affecting all the main body air-sacs, the trachea and lungs. There was a mass of granulomatous tissue on the inner aspect of the sternum. Kidneys and ureters contained muco-purulent exudate and flukes.

K.P. 31,289*a* (*No. II*).—*Imported April,* 1936. *Died* 7/11/41.

The usual kidney lesions were present. The liver was enlarged and histological examination showed a certain degree of hæmatopoiesis. *Bacillus coli* was isolated in pure culture from the heart blood.

K.P. 31,611 (*No. III*).—*Hatched July,* 1936. *Died* 14/11/41.

Post-mortem examination showed it to have a greatly dilated left atrium and right side of the heart. There was intense general venous congestion. The mitral valve had several fibrous scars on its free border capable of causing incompetence. Kidneys and ureters as above.

K.P. 32,758 (*No. IV*) *omitted.—See paper.*

K.P. 31,289*b* (*No. V*).—*Imported April,* 1936. *Died* 9/8/42.

This bird had been suffering from severe abscesses involving the pads of both feet. *Staphylococcus aureus* was isolated from the caseous contents of these abscesses. The usual kidney lesions were present.

K.P. 32,767 (*No. VI*).—*Hatched September,* 1937. *Died* 27/8/43.

This bird had definite nephritis. Scores of flukes were found in the kidneys.

There were deposits of urate crystals in the pericardial sac, and an aneurysm of the left cranial vena cava was present.

Histopathology of the Kidney

Histological preparations showed, in every case, that the flukes tended to occur in pairs in cyst-like spaces. The wall of the cyst varied in its structure according to the site of the parasite, which was invariably either in the main ureter branches, in the ducts of Bellini, or in a greatly dilated collecting tubule in a medullary ray. Lesions were confined to the immediate vicinity of the fluke, the rest of the kidney parenchyma remaining normal. The medullary rays are normally demarcated from the rest of the kidney by a thin sheath of connective tissue. When the parasite establishes itself in one of the collecting tubules it gradually compresses all the surrounding tubules in the ray as it grows. Thus the fluke is usually seen lying in a cavity conforming to its own shape, whose walls are composed of greatly compressed non-functional collecting tubules, often appearing as little epithelial-lined vesicles containing a homogenous acidophilic substance. Outside this area of compressed tissue is the connective tissue sheath.

At a later stage, there is an inflammatory infiltration of cells into the cyst wall, due to chronic irritation. These cells are mainly eosinophils, histiocytes and lymphocytes. Scattered about one also sees occasional erythrocytes, and, later, fibroblasts, the whole being enmeshed in a network of fibrin. Briefly, there is set up a fibro-granular reaction (FIG. 3).

Similar changes occur in the walls of the ducts of Bellini and in the branches of the ureters, with the modification that here the epithelial lining sloughs away, and the lumina of these ducts are filled with débris consisting of granular cells—mainly true eosinophils, histiocytes, lymphocytes, epithelial cells and mucus. The fluke appears to ingest this material (FIG. 4). Small nodes of lymphoid cells are often found in the walls of the cysts.

Pathogenicity

Examination of the post-mortem findings in all the penguins in which the fluke was found shows that in nearly every case there was some unassociated condition which could well account for death. Moreover, the histology of the kidneys does not reveal pathological changes sufficient in themselves to cause fatal illness. No doubt, however, the presence of the parasites plays a part in lowering the resistance of the birds to infection, and it seems likely that a very heavy infestation causes nephritis severe enough to produce death, even in the absence of other conditions.

Description of the Fluke and its Egg

A detailed account of the morphology of the parasite will be given elsewhere at a later date by one of us (J.E.N.S.), so only its main features will be described here.

The flukes are cream-coloured, small, and flattened—mature specimens 2.5 to 3 mm. in length by about 1 mm. in breadth at the widest part, which is in the posterior third. Such specimens usually have a brown area near their centre, easily seen with the naked eye.

Stained and mounted specimens (FIG. 2) show well-marked oral and ventral

PLATE I

FIG. 1.—Trematode Egg x 876. Actual size 36.5 x 17.6μ.

FIG. 2.—Trematode x 54. Kidney, King Penguin. Stained Ehrlich's Acid Hæmatoxylin. Actual length 2.57 mm.

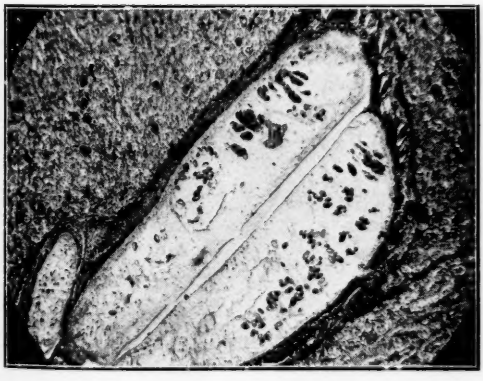


FIG. 3.—L.S. Trematode in Kidney. x 57.

FIG 4.—L.S. Anterior end of parasite lying in a proximal branch of a duct of Bellini. x 65.

suckers, though the latter is often half-hidden by a mass of eggs in the uterus. There is a well-developed muscular pharyngeal bulb beyond the oral sucker, and the alimentary tract soon branches into two intestinal cæca. The vitelline glands lie laterally, occupying the middle three-fifths of the body. The rest of the body cavity is filled up with the uterine coils, testes, ovaries, etc., the exact disposition of which will be described later. The epidermis consists of hexagonal scales from the centre of which arise sharp spines.

The egg is operculate, bilaterally symmetrical and light-brown in colour. It has a thick shell, and is embryonated. Its average size is 36.5 x 17.6 μ.

Discussion

In the upper penguin pool at the Zoological Gardens, where most of the deaths took place, Gentoo penguins and King penguins are mixed. A number of the former have also been examined very thoroughly and in one a few flukes have been found in the kidneys. Recently an immature worm has been detected in the kidney of a Blackfooted penguin from another pool lower down. In the former case the parasites have only been examined in sections—no complete specimens were obtained, so it is impossible to say whether they were similar species, whilst in the latter, the immaturity of the single fluke found also made comparison difficult. In both cases, these birds, whose natural habitat is South Georgia, were hatched in the Zoo.

The problem of the mode of infection naturally presented itself very early in the investigation. Obviously there are interesting possibilities. In the first place, if the birds came already infected from the Antarctic, then the flukes must have found a suitable intermediate host in the Zoo pools—almost certainly a snail. Against this theory it must be remembered that the snails in the ponds are fresh-water varieties, whereas in their natural surroundings the penguins live on marine crustacea and cephalopoda. Therefore, if the original infection was brought about by eating a crustacean or cephalopod acting as an intermediate host—then the fluke must have been capable of radically changing its life-cycle to suit the different fauna of a fresh-water pool.

The second possibility is that the infection arises from the ingestion of infected herring. The metacercarial stage of the parasite may be encysted in the tissues of these fish, on which the penguins are fed. If this is the case, it is most likely that the host of the fluke is some fish-eating bird of the northern ocean, and here, again, the problem of adaptation is raised. This theory, if correct, eliminates the possibility of a life-cycle in the penguin pools.

Examination of the fauna of the pools has not, so far, thrown any light on the problem, as they have recently been cleaned out and aquatic snails are difficult to find. The only other forms of fresh-water life occurring in any abundance are water-fleas (Daphnia pulex) and so-called " fresh-water shrimps " (Gammarus pulex). A few sticklebacks are also present.

Summary

The trematode recorded in the foregoing paper belongs to the genus Renicola (Cohn).[1] From a preliminary examination of the material available it appears to be closely allied to *Renicola lari* (Timon-David),[2] but differing in several measurements of diagnostic value, notably in the consistently larger size of

the ventral sucker and in the much greater development of the vitelline glands in the lateral fields. Further study may reveal that the trematode is new, but for the present it must remain *species inquirenda*. It is hoped to publish a full description elsewhere at a later date, when more material is available.

Acknowledgment

We are indebted to Mr. P. G. D. Morris, of the Anatomy Department, Royal (Dick) Veterinary College, Edinburgh, for taking the photo-micrographs.

REFERENCES:

(1) Cohn, L. (1904): Helminthologische Mitteilungen. *Arch. für. Naturgeschichte.* 77. Jahrg. Bd. 1. Heft. 3. P. 322.

(2) Timon-David, J. (1933): Sur un nouvelle espèce de Renicola trématode parasite du rein des Laridés. *Bull. de l'Institut Océanographique de Monaco.* No. 616.

Clinical Cases

A CASE OF HIGH OR ANTERIOR EPIDURAL ANÆSTHESIA IN A BULL

By JACK K. H. WILDE, B.Sc., A.R.C.S., M.R.C.V.S.
Veterinary Research Officer, Mpwapwa, Tanganyika

THE following is a description of a surgical case which came under my hands and is chiefly interesting because I made use of high epidural anæsthesia.

The subject was a Sahiwal bull (an Indian humped breed), almost fully grown, and weighing about 1,100 lb.

The typical Sahiwal bull has a very large and loose sheath, and this particular bull was seen one day to have developed a prolapse of the inner integument of the sheath, the extruded portion being about five inches in length and four inches in diameter. The cause of this eversion was not known. It is possible that an insect sting may have accounted for the swelling and extrusion.

I attempted to reduce the prolapse manually and by the use of hypertonic solutions, but although actual return of the prolapse was effected, there was no means of making such a reduction permanent, as the swollen part was extruded very shortly after manual pressure was removed.

The Administration of Anæsthesia

The only syringe of reasonable dimensions which was available was a 40 c.c.s all-metal instrument. The main difficulty in administering an epidural injection with this syringe was that the plunger did not work smoothly, and this proved a great disadvantage, as the ease of injection is such a valuable factor in assessing whether the needle is in the epidural space or not.

However, the animal was put into the entrance to a cattle-crush and restrained at the head only. The needle was inserted between the first and second coccygeal vertebræ and 40 c.c.s of a 1 per cent. solution of procaine hydrochloride was injected slowly, about two minutes being taken for the first syringeful. The syringe was now recharged and a second 40 c.c.s given similarly. A wait of about two or three minutes followed, during which time the tail became relaxed and insensitive.

A third syringeful was injected very slowly. When half of the charge had entered the canal, the injection was interrupted for another minute or so, the

bull's reactions being carefully noted. Another 10 c.c.s were injected slowly, and another wait ensued. Weakness of the hind limbs began to show now, and so a further 10 c.c.s were injected (making a total of 120 c.c.s 1 per cent. solution of procaine hydrochloride) and the needle was withdrawn.

The animal now showed signs of sinking to the ground, and so was backed out of the crush. Thereupon, his hind legs ceased to support him and he lay down, the fore and hind legs being restrained by means of ropes tied to stanchions in the crush—pen fence. Care was taken to bolster up the head to prevent the anæsthetic from running forwards.

The sheath of the penis was found to be completely anæsthetised and the prolapse was removed by making a series of overlapping ligation sutures, running through both inner and outer parts of the integument, the extruded portion being cut off with scissors beyond the sutures.

The operation itself was fairly simple and was complicated only by the fact that the swollen prolapsed part was distended with blood and tore very easily when the sutures were tightened.

An hour or two elapsed before the bull was able to support himself on his legs, and even the next day he was very unsteady on his feet. He soon however regained his former vigour and confidence, and made an uneventful recovery.

I wish to express thanks to the Director of Veterinary Services for permission to record this case, and to Mr. Godfrey Mhina, a graduate of Makerere College, for his assistance at the operation.

A REPORT ON TWO CASES OF CARCINOMA OF THE MEMBRANA NICTITANS IN DAIRY COWS

By J. B. TUTT, M.R.C.V.S.
Winchester

Subjects.—A. Shorthorn dairy cow 3½ years old.
B. Shorthorn dairy cow 8 years old.

History.—In Case A the neoplasm was first noticed a month previous to my examination, and although it had grown more rapidly than in Case B the rate of growth was not fast. Case B had been observed for four months.

Examination.—Case A: The growth was situated on the outer aspect of the membrana nictitans of the left eye, and was elongated and sessile in structure. Case B: The growth was situated in a similar position, but was larger and cuplike, having a central crater, and was also sessile. Both neoplasms were red in colour but were not very friable. Although there was lacrymation, the neoplasms did not impinge on the corneas, and there was no keratitis present.

Diagnosis.—Carcinomata.

Treatment.—The animals were cast and secured in the recumbent position. The growths were removed under local anæsthesia. It was necessary to excise the greater part on the membrana nictitans. Hæmorrhage was slight and easily controlled by adrenalin. After-treatment consisted of frequent bathing of the eye with weak antiseptic solutions and the application of eye drops containing a local anæsthetic.

The cases progressed successfully, and there have been no adverse after-effects, although it is too early yet to dismiss the possibility of recurrence.

Pathology.—The growths were sent to the Department of Animal Pathology at Streatley for examination. The following is the report:

Growth A: Histologically, this is a malignant tumour composed of cords of squamous cells, with an intense round cell reaction beneath the deeper part of the tumour. There are fairly numerous mitotic figures and the stroma is poorly developed. Differentiation of the squamous cells into epithelial cell nests has not occurred.

Growth B: This, too, is a squamous-celled carcinoma histologically; in this tumour, however, there are a number of "epithelial pearls" present, and the tumour cell columns appear more adult in type. The stroma is also well developed. There are numerous mitotic figures.

Discussion.—It is of interest to note that both these cases occurred about the same time in the same herd. The animals were related in that they were sired by the same bull, but were from different maternal parents.

Tetanus in a Dog

Subject.—Smooth-haired terrier puppy male, 10 weeks old.

History.—The animal had been unwell for 24 hours. There was no previous history of any illness or injury except that it had been trodden on about 14 days previously. There was no wound to be found.

Examination.—The animal was in a state of marked tetany. The extensors of the limbs were tetanised, so that the animal stood stiffly like a "wooden horse." The parietal and temporal muscles were tetanised, so that the forehead was wrinkled and the ears drawn back. The jaws were partially locked and the lips drawn back, giving the well-known "risus sardonicus" appearance. The head was held high and there was only abdominal breathing present. External stimulus produced a general convulsion, the animal falling stiffly to its side and the above symptoms were exaggerated. With great difficulty it could move with a few stiff padding steps, but would soon fall in a tetanic convulsion. The membrana nictitans did not react as seen in the horse. The temperature was normal.

Diagnosis.—Tetanus.

Treatment.—The case was considered to be hopeless, but treatment was adopted at the owner's wish. The puppy was given 6,000 I.U.s of tetanus antitoxin intravenously and 3,000 I.U.s subcutaneously. This was repeated on the second day, together with an anæsthetic dose of nembutal intravenously; the following day the animal was worse, being almost completely tetanised and unable to stand and having convulsions. It was destroyed.

Conclusion.—It is of interest to note that as far as was seen there was no sign of any wound, nor was there any history of a wound. The disease was also very acute, there being no mild symptoms at the onset. The body after death went into rigor mortis in the tetanised condition position similar to that seen just prior to death.

A Case of Double Intussusception in the Dog

Subject.—A crossbred chow puppy 3 months old.

History.—Persistent diarrhœa for about a month, recently complicated by

a temporary and recurrent prolapse of the bowel at the anus. The animal was feeding well, in good condition and quite bright.

Examination.—The prolapse was not seen at the time of attendance, as it had corrected itself. There was no temperature, but the diarrhœa was of an "anchovy-like" nature in colour. Abdominal palpation revealed a "sausage-like body" in the abdomen.

Diagnosis.—Intussusception which had at recurrent periods prolapsed at the rectum.

Treatment.—The subject was anæsthetised by intravenous nembutal, and a midline incision was made after the usual preparation. A double intussusception was revealed about five inches long. It consisted of an ileo-*iliac** intussusception of about five inches which had in turn intussuscepted through the ileo colic valve into the colon. There were no adhesions present but, at first, it was found impossible to reduce the intussusception; however, when the outer layer of bowel was incised at the inturning it was easily reduced. The incision in the bowel was sutured and the abdominal incision closed. The incision healed by first intention in seven days and the sutures were removed in ten days. The patient progressed satisfactorily and there was no recurrence.

Conclusion.—It is of interest to note the extent of the intussusception coupled with the lack of adhesions, although it must have been present some time.

* Ilium into ilium (not ilium into cæcum) and this intussusception through into colon.

Abstract of Current Literature

EAR MARKINGS OF PIGS—A WORKABLE SYSTEM†

By DR. L. E. HANSON
University of Nebraska, Lincoln, Nebraska

THE system of ear-notching pigs illustrated below was obtained through Dr. L. M. Winters, Division of Animal Husbandry, College of Agriculture, St. Paul, Minnesota. This system has been adopted and is being used in the University of Nebraska herd.

In this system each part of the ear is assigned a basic number, as is shown in the first illustration. To get the numbers which are not basic, the basic numbers (notches) are combined, as is shown in the succeeding illustrations. *When this system is used it is important that the notches be accurately placed.* Otherwise confusion will arise in reading them.

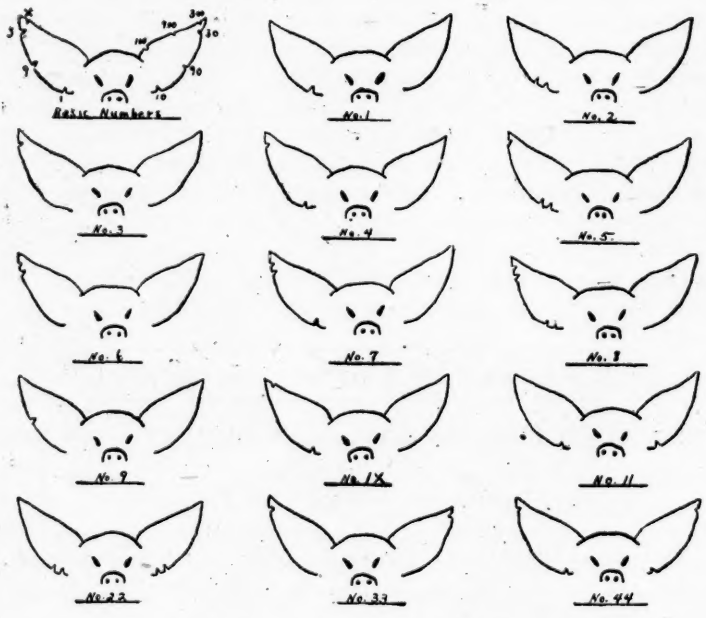
This system of marking can be used in two ways. In our work we use it to give each pig an individual number. When used in this manner one hundred litters can be marked without duplicating the numbers. For those who do not need individual numbers for each pig, but simply wish to identify litter-mates, this system will allow the marking of 999 litters without duplicating numbers.

Unless special permission is obtained, some of the breed associations require that all pigs in a litter carry the same ear-notches. For the average producer therefore it will work out most satisfactorily if all pigs in a litter are given the same notch. Thus the first litter would be notched with No. 1, the second litter

† *Veterinary Medicine*, Vol. xxxviii, No. 1, June, 1943.

with No. 2, and so forth. The small producer who farrows only 15 to 20 litters a season can simplify the marking further by not using the numbers at the top of the left ear. In other words, it will require five years to mark 100 litters if he farrows 20 litters a year, or 2½ years if he farrows the same number of litters each spring and fall season. In most of the smaller herds the pigs which received the small numbers will then be out of the herd and the series can start with No. 1 again.

In using this system to give pigs individual numbers, the left ear is reserved for the litter number and the right ear for the pig's individual number. Thus,

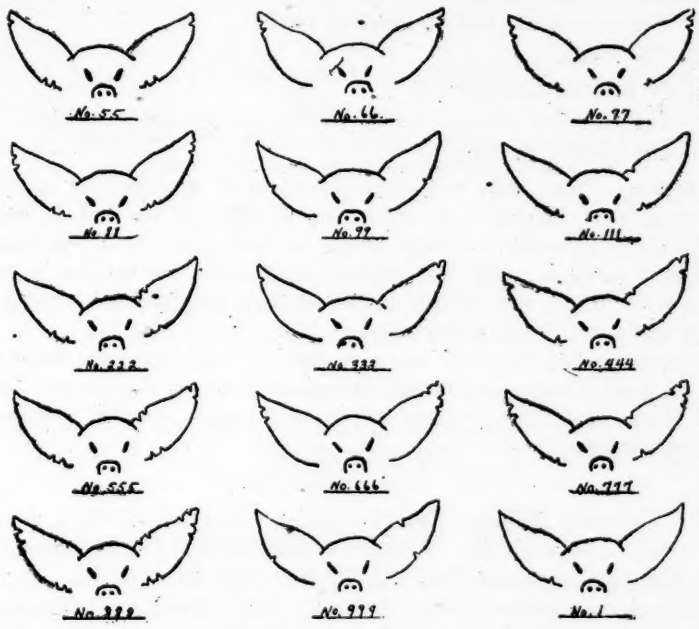


the first litter has no notches in the left ear and is the zero litter, the pigs being numbered from 1 through 9. The second litter is the No. 10 litter and the pigs are numbered from 10 through 19, the third litter is numbered from 20 through 29, and so forth.

In this way a series of 10 numbers is reserved for each litter, and all pigs in a litter carry the same notches in the left ear. If there are less than 10 pigs in the litter, the following litter starts on the next "ten series" and the unused numbers are omitted. If there are more than 10 pigs in the litter the extra pigs are given an X notch plus the numbers. For example, assume that the first sow farrows five pigs, the second sow farrows 10 pigs and the third sow 13 pigs. The five pigs in the first litter would be numbered 1, 2, 3, 4 and 5. The pigs in the second litter would be numbered 10, 11, 12, 13, 14, 15, 16, 17, 18 and 19. The pigs in the third litter would be numbers 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 20X, 21X and 22X.

The scheme which I have outlined is very satisfactory for the lop-eared

breeds. In the breeds with erect ears, such as the Hampshire and Berkshire, the ear is so constructed that it is difficult to place the 100 notch as I have illustrated it. Therefore in marking pigs of these breeds I would suggest that



the 900 number be replaced by 100 and the 100 notch eliminated. This will reduce the amount of numbers which can be used before one starts again with No. 1, but for most breeders this modified scheme will provide sufficient numbers.

In areas where the winters get quite severe it is a good practice to notch fall farrowed pigs a bit deeper than spring farrowed pigs. Otherwise one may lose the identity of the pigs if their ears get slightly frost bitten.

Reviews

Animal Nutrition and Veterinary Dietetics. By R. G. LINTON, P.H.A., M.R.C.V.S., and GRAHAME WILLIAMSON, O.B.E., M.R.C.V.S., D.V.S.M. W. Green & Son, Ltd., 2-4, St. Giles Street, Edinburgh. Price 35s.

A WELCOME book, especially at the present time, when the nutrition of both animal and man is coming more and more to the fore. It is now recognised that good health largely depends upon good nutrition, and to those who would aspire to a knowledge of the principles on which the science is based Prof. Linton's book will be truly welcome. The present edition is a great improvement on the 1927 issue, as might be expected, for since that date the subject has taken tremendous strides, and although there is still much to learn we have already

much at hand which is of great value. By sifting and collecting within the pages of a single book information which is not readily available to the majority, the authors have rendered a great service to their profession. The book is arranged in five sections, as follows:

(i) The composition and function of foods.
(ii) The foods.
(iii) Preparation and storage.
(iv) The nutritive value of foods and the construction of rations.
(v) The feeding of animals.

The pages dealing with the vitamins and toxic minerals and section (v) will be particularly useful to the veterinary reader. At the end of the book is a most useful appendix, in which weight of foods, the vitamin content, composition and nutritive value and mineral composition are set out in readily available form, which will obviate much searching and turning of pages when one is in search of specific information.

In recommending the book to our readers we will hazard the thought that such is the rapid advancement in this all-important subject that we will not have to wait fifteen years for the next edition of Linton's *Animal Nutrition and Veterinary Dietetics.*

Banham's Veterinary Biology. Seventh Edition. Revised by W. J. IRONSIDE, M.P.S., M.R.C.V.S. Baillière, Tindall & Cox, 7-8, Henrietta Street, Covent Garden, London, W.C.2. Price 12s. 6d.

WHEN Banham produced this little book in 1887 he could not have dreamed that for over half a century it would remain one of the most popular books in veterinary literature or that it would run to seven editions. As new editions have arrived one has noticed changes in its contents. Additions and deletions have been made as circumstances demanded, a true sign of virility often absent in text-books. In spite of these changes, it still breathes the spirit of Banham. In this latest edition, W. J. Ironside and his helpers have brought the material up to date and so added greatly to its value. It is to be regretted that there is little reference to the endocrins or vitamins. It is to be hoped that they will bear this in mind in future editions. Apart from the above criticism, one can say that the book is a veritable mine of useful information and a vade-mecum for the veterinary student and practitioner.

Publishers' Notices

Copy of advertisements should be in the hands of the publishers—Baillière, Tindall and Cox—not later than the 1st of the month, if proof is required.

Binding Cases for Volume 98 and any previous volumes can be obtained from the Publishers. Price 3s. 9d. post free.

Letters for the Journal, literary contributions, reports, notices, books for review, exchanges, new instruments or materials, and all matter for publication (except advertisements) should be addressed to

Binding Cases for Volume 97 and any other previous volumes can be obtained from the Publishers.

Annual Subscription, 25s. ($6.00 U.S.A. currency, post free.)